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(54) Method and apparatus for packaging products absorbing carbon-dioxide, in particular perishable food products.

(57) A method and an apparatus for packaging products susceptible of absorbing carbon dioxide, in particular perishable food products. The method comprises the step of inserting a product (1) in a containment package (2) and the step of sealing the package. Before sealing, a preset amount of solid-phase carbon dioxide (3) is introduced in the containment package. The sublimated carbon dioxide is then absorbed by the packaged product, avoiding collapse of the package.

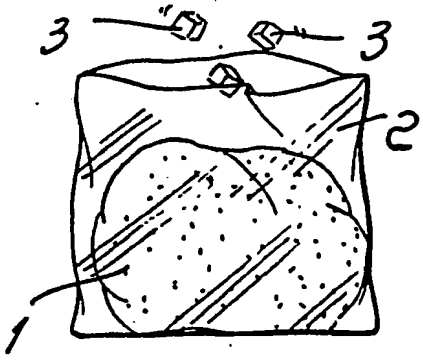

Fig. 2

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METHOD AND APPARATUS FOR PACKAGING PRODUCTS ABSORBING CARBON-DIOXIDE, IN PARTICULAR PERISHABLE FOOD PRODUCTS

The present invention relates to a method and an apparatus for packaging products absorbing carbon dioxide, in particular perishable food products.

As is known, in order to improve the preservability of perishable food products, in particular meat products, which have the ability to absorb carbon dioxide, such products are packaged with adapted devices which alter or completely replace the atmosphere inside the product containment package before it is finally sealed by introducing therein gaseous-phase carbon dioxide or a mixture of gases composed also of carbon dioxide.

The progressive absorption of carbon dioxide on the part of the product acidifies it, entailing a significant improvement to its preservability.

Said progressive absorption of carbon dioxide also causes a reduction of the carbon dioxide in the space surrounding the product, consequently producing a vacuum inside the package with the disadvantage of an inward collapse of the package if it is made of easily deformable material, as is usually the case for synthetic-material packaging containers.

In the case of products capable of absorbing large amounts of carbon dioxide, such as for example meat products, the collapse of the package can cause the crushing of the products contained therein, deforming them and in some cases squeezing liquids out of them which make the appearance of said products extremely unappealing.

In view of the fact that these packaging methods are predominantly used for food products, the problem of the vacuum which forms inside the package, with the consequent deformation thereof, is strongly felt in the field, since very often it compromises the salability of the product.

The absorption of carbon dioxide by the product furthermore modifies the percentages of gas, reducing the free carbon dioxide in the atmosphere inside the container and limiting the potential preservability of the product.

The deformation of the packaging container, besides causing problems related to the appearance of the product, may furthermore cause the customer information, such as for example the date before which the product is to be eaten or other indications which are usually printed directly on the package or on sheets glued to the package or inserted therein, to become partially or totally unreadable.

The aim of the present invention is to solve the above described problems by providing a method for packaging products susceptible of absorbing carbon dioxide, in particular perishable food products, which avoids or at least considerably reduces the deformation of the package caused by vacuum after packaging.

Within the scope of the above described aim, an object of the invention is to provide a method which improves the preservability of products susceptible of absorbing carbon dioxide and respects the integrity of the product during packaging.

Another object of the invention is to provide a method which does not contaminate the product with health-damaging substances.

This aim, as well as these and other objects which will become apparent hereinafter, are achieved by a method for packaging products susceptible of absorbing carbon dioxide, in particular perishable food products, as defined in claim 1.

The characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the method according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figures 1 to 5 illustrate in sequence the various steps of the packaging method according to the invention; and

figure 6 is a schematic lateral elevation view of a packaging apparatus for automatically performing the method according to the invention.

With reference in particular to figures 1 to 5, the method according to the invention comprises a first step wherein a product 1 or a plurality of products is inserted into a known containment package 2 made for example of synthetic material (figure 1), and a second step in which a preset amount of solid-phase carbon dioxide is introduced inside the package 2 (figure 2).

The package 2 is subsequently sealed, for example by heat-welding, glueing or by other known sealing methods, so as to isolate the inside of the package from the atmospheric environment.

The introduction of solid-phase carbon dioxide into the package 2 may naturally precede or follow the insertion of the product 1 or be simultaneous therewith.

The amount of carbon dioxide to be introduced in the package 2 is preset according to the amount of carbon dioxide which can be absorbed by the product after packaging, taking also into account the mechanical resistance of the package 2 and the final result to be obtained, for example so as to avoid the collapse of the package 2 even several days after packaging.

The amount of solid-phase carbon dioxide to be introduced in the package 2 may be easily

determined on the basis of studies of the absorption in the various products, since it has been found that most of the products susceptible of absorbing carbon dioxide absorb most of the potentially absorbable carbon dioxide within a few hours after packaging, reaching a condition of equilibrium.

The solid-phase carbon dioxide is introduced into the package 2 in the form of cubes or tablets 3 of dry ice with a preset weight so as to meet the absorbability requirements of the product as described above.

As an alternative, the solid-phase carbon dioxide may also be introduced in the package 2 in the form of finely flaked dry ice ("carbonic snow").

Advantageously, before sealing, it is possible to "wash" the inside of the package 2 by means of a jet of inert gas, for example nitrogen, which at least partially replaces the air inside the package 2.

If required, the air present in the package 2 may be replaced completely with a controlled atmosphere constituted for example by a mixture of gas which predominantly contains carbon dioxide and nitrogen, sealing the package in an appropriate chamber 4 with a controlled atmosphere, as occurs in known packaging methods indeed termed "controlled-atmosphere packaging methods".

After sealing, the solid-phase carbon dioxide introduced in the package 2 slowly sublimates, pressurizing the interior of the package, while the product starts to absorb the gaseous-phase carbon dioxide, progressively decreasing the overpressure which has formed inside the package 2 (figure 4). A few hours after packaging, the pressure inside the package 2 stabilizes and the package 2 assumes a configuration which remains substantially unchanged for several days after packaging (figure 5). For example, if the amount of solid-phase carbon dioxide introduced in the package 2 together with the amount of gas-phase carbon dioxide possibly introduced when replacing the atmosphere inside the package 2 (if replacement is provided for) is slightly larger than the amount of carbon dioxide required to make the product reach the equilibrium condition, a mixture of gases, including carbon dioxide, with a slight overpressure or at ambient pressure is present inside the package 2 even several days after packaging, so as to avoid collapse even with packages which have an extremely low mechanical resistance or do not have an own form, such as soft bags.

It should be noted that with the method according to the invention, if a complete replacement of the atmosphere inside the package 2 is not required, both the step of introducing solid-phase carbon dioxide inside the package and the subsequent step of sealing the package 2 may occur in an atmospheric environment, since for a wide range of products correct preservation is in any case ensured by the modification of the atmosphere inside the package 2 caused by the sublimation of the solid-phase carbon dioxide.

While the method according to the invention may be carried out in a simple manner even by a sequence of manual operations, by virtue of its simplicity, an apparatus generally indicated by the reference numeral 10 in figure 6 may be used; said apparatus comprises a known packaging system with a conveyor element 11 on which the preformed packages 12 intended to contain the products 1 are placed. Said conveyor element 11 is movable along a path which traverses in sequence a station 5 for inserting the products 1 in the packages 12 and a sealing station 13 in which the packages 12 are closed by means of known devices. According to the invention, a dispenser device 14 is arranged ahead of the sealing station 13 according to the direction of advancement of the conveyor element; said device introduces a preset amount of solid-phase carbon dioxide into the packages 12 and may be simply constituted, as illustrated, by nozzles which are fed by a known system and dispense a preset amount of finely flaked dry ice onto the product inside the package which is located in that moment below said nozzles.

According to another embodiment, not illustrated for the sake of simplicity, the dispenser device may also be constituted by a means for dispensing dry ice tablets which are introduced, like the finely flaked dry ice, in the packages 12.

The sealing station 13 may be simply constituted by a known device which closes the open side of the packages 12 for example by heat-welding thereon a sheet of synthetic material 15.

If it is necessary to replace the atmosphere inside the packages 12, the sealing station 13 may be placed inside a controlled-atmosphere chamber 16 which contains, in a known manner, a mixture of gases, for example a mixture of carbon dioxide and nitrogen, as in known controlled-atmosphere packaging devices.

If complete replacement of the atmosphere inside the packages 12 is not required, a partial replacement of the atmosphere inside the packages 12 may be provided by arranging a dispenser 17 of inert gas, for example nitrogen, ahead of the solid-phase carbon dioxide dispensing device 14. Said dispenser 17 may be simply constituted by a duct which feeds a jet of inert gas inside the packages 12.

In practice it has been observed that the method according to the invention fully achieves the intended aim, since by virtue of the introduction of solid-phase carbon dioxide the amount of carbon dioxide which is absorbed by the product after packaging is compensated and therefore in prac-

tice vacuum does not form inside the package or in any case it can be kept within such limits as not to modify the original shape of the package to a significant extent.

A further advantage, in view of the simple execution of the method according to the invention, is the fact that it can be used in both manual packaging methods and in automated packaging methods.

Though the method according to the invention has been conceived in particular for the packaging and preservation of perishable food products, it may in any case be used successfully also for any kind of product susceptible of absorbing carbon dioxide with similar problems regarding the integrity of the package and of the product after packaging.

The method thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with technically equivalent elements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A method for packaging products absorbing carbon dioxide, in particular perishable food products, comprising 3 the steps of introducing a product in a containment package and sealing said containment package, characterized in that a preset amount of solid-phase carbon dioxide is inserted in said containment package before said sealing step.

2. A method according to claim 1, characterized in that said solid-phase carbon dioxide is inserted in said containment package in the form of dry ice.

3. A method according to claim 1, characterized in that said solid-phase carbon dioxide is inserted in said containment package in the form of finely flaked dry ice (carbonic snow).

4. A method according to any of the preceding claims, characterized in that the packaging is performed in an atmospheric environment.

5. A method according to any of the preceding claims, characterized in that the inside of said package is washed by means of a jet of inert gas before said sealing step.

6. A method according to any of the preceding claims, characterized in that said sealing step is performed in a controlled-atmosphere chamber.

7. A method according to any of the preceding claims, characterized in that said controlled atmosphere is constituted by a gas or mixture of gases with at least one part of gaseous-phase carbon dioxide.

8. A method according to any of the preceding claims, characterized in that the amount of solid-phase carbon dioxide introduced in said containment package is preset according to the amount of carbon dioxide which can be absorbed by the product after packaging.

9. An apparatus (10) for packaging products absorbing carbon dioxide, in particular perishable food products, comprising a conveyor element (11) for packages adapted to receive the products (1) to be packaged, said conveyor element being movable along a path which traverses in sequence a station (5) for inserting the products in said packages (12) and a station (13) for sealing said packages, characterized in that it comprises, ahead of said sealing station (13), in the direction of advancement of said conveyor element (11), a device (14) for dispensing preset amounts of solid-phase carbon dioxide into said packages.

10. An apparatus according to claim 9, characterized in that said sealing station (13) is accommodated in a chamber (16) which contains a gas or a mixture of gases with at least one part of carbon dioxide.

11. An apparatus according to claim 9, characterized in that said dispenser device (14) comprises nozzles which dispense finely flaked dry ice (carbonic snow).

12. An apparatus according to claim 9, characterized in that said dispensing device (14) comprises a device for dispensing tablets of dry ice.

13. An apparatus according to any of the preceding claims, characterized in that a dispenser of inert gas is arranged ahead of said device (14) for dispensing solid-phase carbon dioxide, in the direction of advancement of said conveyor element (11), for washing the inside of said packages (12).

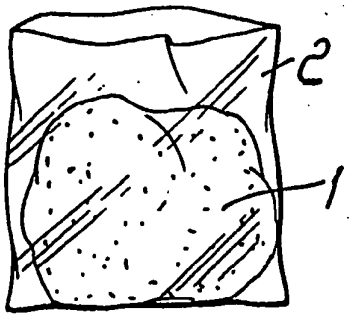

FIG. 1

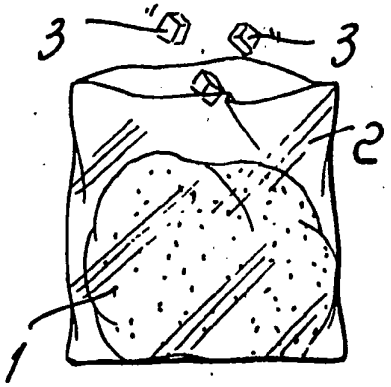

FIG. 2

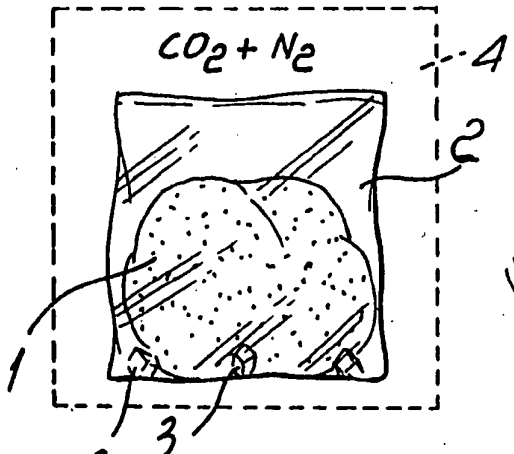

FIG. 3

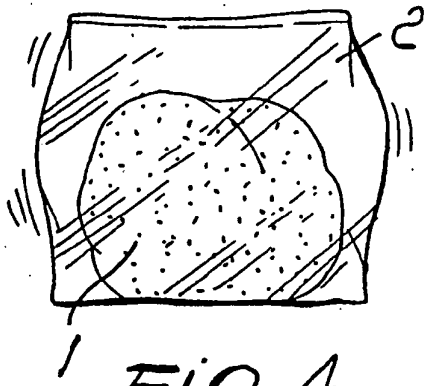

FIG. 4

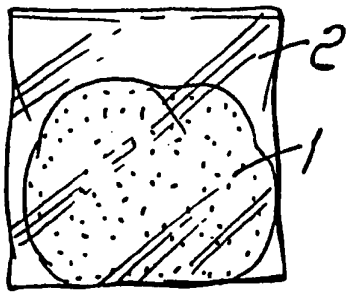

FIG. 5

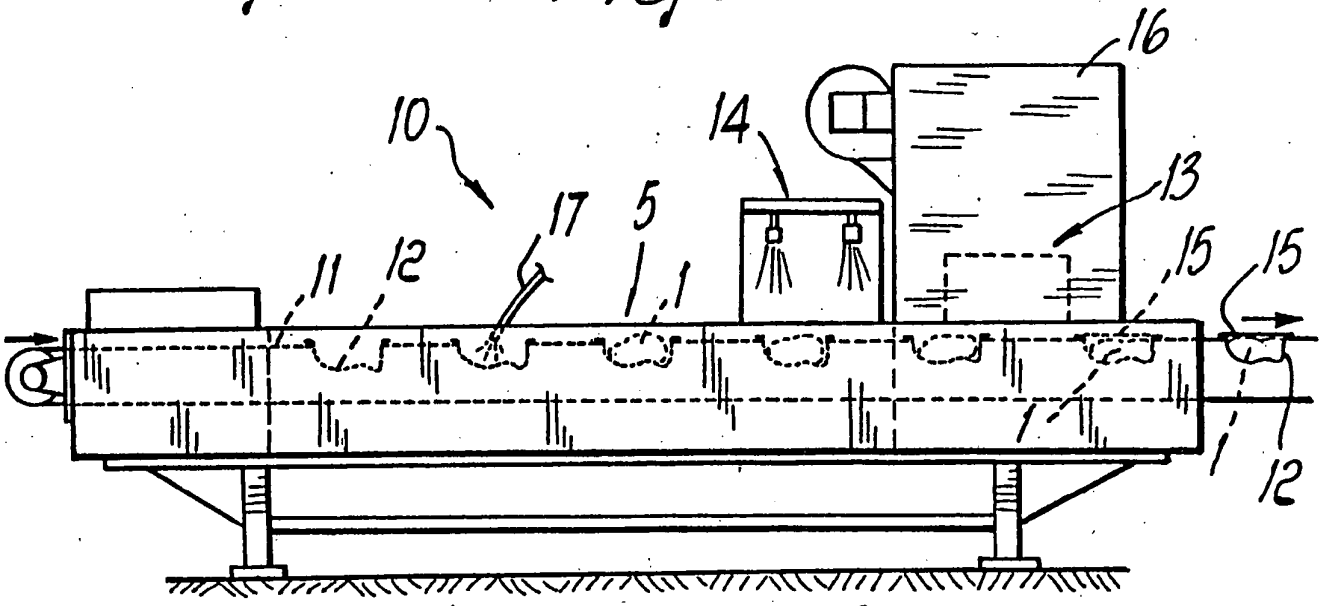

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number

EP 89 12 0103

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-2 838 403 (NOTTER) * Column 1, line 20 - column 2, line 10 * ---	1,2,4	B 65 B 25/06 B 65 B 31/00
Y		5,6,7,9	
Y	US-A-3 987 209 (GATINEAU) * Column 5, line 39 - column 6, line 25; figure 1 * ---	5,6,7	
A		10	
X	US-A-4 653 643 (BLACK) * Column 3, lines 44-55; column 4, lines 8-14; figures 1,2 * ---	1,2,4	
A		8	
Y	US-A-3 659 393 (RICHTER) * Column 1, line 67 - column 2, line 22 * -----	9	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 B
B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	07-02-1990	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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